

## REMARKS

By this response, Applicants have amended claim 29 to correct its dependency and added a new claim 38. As a result, claims 11-12, 14 and 21-38 are pending in this application. Reconsideration of the rejections of all claims in view of the following remarks is respectfully requested.

In the Office Action, the Office allows claims 11-12, 14, and 21-22, and indicates that claims 25, 30, and 31 include allowable subject matter. Applicants thank the Examiner for the recognition of the allowable subject matter in these claims.

However, the Office rejects claims 23-25, 26-29, and 32-37 under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 5,200,633 (Dickert) in view of U.S. Patent No. 7,017,389 (Gouma). In order to establish a *prima facie* case of obviousness, the Office must show that (1) every feature is taught or suggested by Dickert or Gouma; (2) Dickert, Gouma, or generally available knowledge suggests or motivates the modification(s); and (3) one would have a reasonable expectation of success. MPEP 2143. Because the Office fails to establish a *prima facie* case of obviousness, Applicants respectfully request withdrawal of the rejections of claims 23-24, 26-29, and 32-37 for the following reasons.

### Claim 23

With respect to claim 23, the Office fails to show, *inter alia*, that Dickert or Gouma teaches or suggests a gallium nitride (GaN) sensing layer disposed below the contact, wherein the sensing layer is exposed to the medium in an area below the contact by at least one perforation in at least one of the contact and a second layer disposed between the sensing layer and the contact as in the claimed invention. The Office recognizes that Dickert fails to teach or

suggest such a feature. However, the Office cites Gouma as allegedly teaching the claimed feature.

In particular, the Office alleges that Gouma teaches “the required Gallium Nitride based sensing transistor substrate”. Office Action, page 3. The Office cites column 5 of Gouma in support of this conclusion. Gouma teaches a sensor that includes a GaN substrate, a plurality of electrodes, and a thin film metal oxide. Gouma, col. 5, lines 28-32. In operation, “a gas or gaseous mixture is contacted with the thin metal oxide. Conductors are provided to connect the electrodes of the sensor to electrical measuring means for measuring the resistance and/or capacitance, and/or impedance of the thin film metal oxide.” Gouma, col. 16, lines 1-13.

**A. Gouma’s substrate is not a sensing layer**

Contrary to the Office’s assertion, the substrate in Gouma is not a sensing layer as in the claimed invention. In fact, Gouma expressly states that the sensing layer is a metal oxide, which is unrelated to the claimed Gallium Nitride layer. See, e.g., Gouma, col. 5, lines 22-27. Further, Gouma is silent as to the contribution, if any, that the substrate provides to operation of the sensors, apart from mechanically holding the sensing layer and electrodes in place. See, e.g., Gouma, col. 10, lines 53-60. As a result, Gouma fails to teach or suggest the claimed gallium nitride (GaN) sensing layer.

**B. Gouma does not teach or suggest exposing substrate to gas**

Additionally, Gouma fails to teach or suggest that the substrate is exposed to the medium. To the contrary, Gouma only discusses the thin film metal oxide and/or electrodes being exposed to the gas or gaseous mixture. See, e.g., Gouma, col. 5, lines 33-43; col. 6, lines 22-28. In sharp

contrast, the claimed sensing layer is exposed to the medium. As a result, Gouma fails to teach or suggest the claimed gallium nitride (GaN) sensing layer, which is exposed to the medium.

### **C. Conclusion**

In light of the above, either alone or in combination, Applicants respectfully submit that the Office has failed to show that one in the art would obtain Applicants' claimed invention based on the combined teachings of Dickert and Gouma. As a result, Applicants respectfully request withdrawal of the rejection of claim 23 and claims 24, 26-29, and 32, which depend therefrom, as allegedly being unpatentable over Dickert in view of Gouma.

#### **Claim 31**

With respect to claim 31, Applicants note that in the text of the rejections, the Office states that claim 31 is allegedly rejected. However, claim 31 depends from claim 30, which together with claim 31 is indicated as allowable elsewhere in the office action. As a result, Applicants submit that the Office erred by including claim 31 in the text of the rejections.

#### **Claim 33**

With respect to claim 33, the Office fails to show, *inter alia*, that Dickert or Gouma teaches or suggests an electrical contact that includes at least one perforation to expose a sensing layer to the medium; a dielectric layer disposed below the contact; and a nitride active structure disposed below the dielectric layer, wherein the sensing layer comprises at least one of: the dielectric layer and a semiconductor layer in the active structure as in the claimed invention.

Applicants note that neither Dickert nor Gouma teaches or suggests the claimed nitride active structure disposed below a dielectric layer. As discussed above with respect to claim 23, Gouma teaches a GaN substrate, but is silent on any functionality provided by the substrate,

apart from mechanically holding the sensing layer and electrodes in place. See, e.g., Gouma, col. 10, lines 53-60. In sharp contrast, as is known in the art, the claimed active structure comprises the layer(s) that provide the desired functionality for the semiconductor device.

In light of the above, Applicants respectfully submit that the Office has failed to show that one in the art would obtain Applicants' claimed invention based on the combined teachings of Dickert and Gouma. As a result, Applicants respectfully request withdrawal of the rejection of claim 33 and claims 34-38, which depend therefrom, as allegedly being unpatentable over Dickert in view of Gouma.

### **Claims 23 and 33**

With respect to both claims 23 and 33, Applicants submit that the Office has failed to show that Dickert, Gouma, or generally available knowledge suggests or motivates the modification(s). In support of the combination, the Office alleges that one would be motivated to implement the combination "in order to have a semiconductor sensor with increased performance and speed." Office Action, p. 3. However, the Office fails to cite any portion of Dickert or Gouma that suggests or motivates such a result. In fact, as discussed previously, Gouma is silent with respect to any benefits provided by a GaN substrate to the sensing process, apart from mechanically holding the sensing layer and electrodes in place. Further, Dickert only teaches the use of insulating and protective layers on a substrate directly below the sensor layer. To this extent, Applicants respectfully submit that such motivation, if present, is only found using the hindsight of Applicants' claimed invention.

In light of the above, Applicants respectfully submit that the Office has failed to show that one in the art would obtain Applicants' claimed invention based on the combined teachings

of Dickert and Gouma. As a result, Applicants respectfully request withdrawal of the rejection of claims 23 and 33 and claims 24, 26-29, and 34-38, from one of which each of these claims depends, as allegedly being unpatentable over Dickert in view of Gouma.

#### **Claim 34**

With further respect to claim 34, Applicants note that Dickert fails to disclose a dielectric layer that includes at least one perforation as in the claimed invention. The Office fails to cite any portion of Dickert that allegedly discloses this feature. As a result, Applicants respectfully request withdrawal of the rejection of claim 34 as allegedly being unpatentable over Dickert in view of Gouma. However, should the Office maintain its rejection, Applicants respectfully request that the Office particularly point out that portion of Dickert that allegedly discloses a dielectric layer that includes at least one perforation.

#### **Claim 35**

With further respect to claim 35, Applicants note that Gouma fails to disclose an active structure that comprises an aluminum gallium nitride (AlGaN)/gallium nitride (GaN) heterostructure as in the claimed invention. The Office fails to cite any portion of Gouma that allegedly discloses this feature. Further, Applicants note that Gouma does not include any mention of an AlGaN layer or a nitride heterostructure. As a result, Applicants respectfully request withdrawal of the rejection of claim 35 as allegedly being unpatentable over Dickert in view of Gouma. However, should the Office maintain its rejection, Applicants respectfully request that the Office particularly point out that portion of Gouma that allegedly discloses an aluminum gallium nitride (AlGaN)/gallium nitride (GaN) heterostructure.

**Claim 38**

By this Amendment, Applicants have added a new claim 38. Applicants respectfully submit that claim 38 is patentable over the cited art as presented. For example, even if, *arguendo*, Dickert's sensing layer comprises a dielectric layer as alleged by the Office, Dickert's sensing layer must comprise "at least one hydrophobic metal complex with an ion mobility or ionic concentration or optical properties, which change under the effect of gas or vapor." Dickert, Abstract. Applicants note that the claimed Silicon Dioxide (SiO<sub>2</sub>) or Silicon Nitride (SiN) do not comprise such a hydrophobic metal complex.

**Conclusion**

Applicants submit that each of the pending claims is patentable for one or more additional unique features. To this extent, Applicants do not acquiesce to the Office's interpretation of the claimed subject matter or the references used in rejecting the claimed subject matter. Additionally, Applicants do not acquiesce to the Office's combinations and modifications of the various references or the motives cited for such combinations and modifications. These features and the appropriateness of the Office's combinations and modifications have not been separately addressed herein for brevity. However, Applicants reserve the right to present such arguments in a later response should one be necessary.

In light of the above, Applicants respectfully submit that all claims are in condition for allowance. Should the Examiner require anything further to place the application in better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the number listed below.

Respectfully submitted,

/John LaBatt/

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